RECOVERY PROGRAM Recovery Program Project Number: 172
FY 2018-2019 SCOPE OF WORK for:

Remote monitoring of endangered fishes in the middle Green River

Reclamation Agreement number: ____
Reclamation Agreement term: ____

Note: Recovery Program FY18-19 scopes of work are drafted in May 2017. They often are revised before final Program approval and may subsequently be revised again in response to changing Program needs. Program participants also recognize the need and allow for some flexibility in scopes of work to accommodate new information (especially in nonnative fish management projects) and changing hydrological conditions.

Lead agency: Utah Division of Wildlife Resources

Submitted by: Michael S. Partlow and Matthew J. Breen
Utah Division of Wildlife Resources
Northeast Regional Office
318 North Vernal Avenue
Vernal, Utah 84078
Phone: 435-781-9453; Fax: 435-789-8343
E-mail: mpartlow@utah.gov

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Category:
__ Ongoing project
__ Ongoing-revised project
X Requested new project
__ Unsolicited proposal

Expected Funding Source:
__ Annual funds
__ Capital funds
__ Other *[explain]*

I. Title of Proposal:

Remote monitoring of endangered fishes in the middle Green River

II. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

V.	Monitor populations and habitat and conduct research to support recovery actions (research, monitoring and data management).
V.A.	Measure and document population and habitat parameters to determine status and biological response to recovery actions.
V.A.1.a.(2)	Investigate improving recapture rates through passive PIT tag monitoring, nets, etc. to improve population abundance estimates.
V.A.3.	Collect and submit data according to standard protocol (e.g., location, PIT tag #, length, weight, etc.) on endangered fish encountered in all field activities in order

to provide annual information on population status outside of formal population estimates.

V.B. Conduct research to acquire needed life history information.

V.B.2. Conduct appropriate studies to provide needed life history information.

V.D. Establish sampling procedures to minimize adverse impacts to endangered fishes.

V.D.2. Implement scientific sampling protocols to minimize mortality for all endangered fishes.

V.F. Assess relative biological importance of tributaries and their potential contributions to endangered fish recovery.

GREEN RIVER ACTION PLAN: MAINSTEM

V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring and data management).

V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

Study Background/Rationale and Hypotheses:

Wild razorback sucker (*Xyrauchen texanus*) populations were in sharp decline in the 1980s and extirpated shortly after in the upper Colorado River basin. Therefore, populations have been augmented by a stocking program beginning in 1995, which steadily increased in production and efficiency (size and numbers) since 2000 (Bestgen et al. 2012). Due to extensive stocking efforts, populations have increased to a point where a portion of individuals are successfully reproducing, including range expansion to other areas (Webber et al. 2013). Known spawning locations in the middle Green River include Razorback and Escalante bars (Modde and Irving 1998), and it has been shown that hatchery-reared razorback sucker migrate to these same spawning areas (Modde et al. 2005). Although razorback sucker (hatchery-reared and/or wild fish) likely congregate in other areas of the middle Green River for various aspects of their life history, there is limited information on the abundance and extent of areas outside of the aforementioned spawning bars.

As identified in Bestgen et al. (2012), there is a critical need to improve recaptures of razorback sucker; recently the same need has been identified for Colorado pikeminnow (*Ptychocheilus lucius*). Moreover, managers require a better tool to increase encounters/recaptures of these species in order to generate population and/or survival estimates to aid in understanding recovery status. However, there is no dedicated active sampling effort (e.g., boat or raft electrofishing) to increase razorback recaptures (e.g., UCRRP Project #128), and researchers have expressed concerns about collecting razorback sucker data simultaneously while conducting Colorado pikeminnow population estimates, a project that occurs at an appropriate time to target razorback suckers. More importantly, active sampling techniques have provided low recapture rates of PIT-tagged razorback suckers (~2%) and Colorado pikeminnow recaptures have decreased during recent population estimate surveys (Kevin Bestgen, personal communication). In contrast, passive techniques (i.e., stationary PIT antennae) have been quite successful, including encounters of individuals that have avoided active capture for years or even decades (Webber and Beers 2014). As shown by Webber and Beers (2014), targeting razorback sucker when in spawning aggregates greatly increases

encounter rates, but this should be accomplished non-intrusively in a passive manner given the high level of disturbance from multiple projects that rely on electrofishing techniques in the upper Colorado River basin.

We identify procedures to investigate razorback sucker aggregations within the proximity of proven spawning locations to better understand population dynamics, range expansion, and to provide supplemental information for vital rate estimation. In addition, with flexibility in sampling location, we anticipate encounters of other endangered species in these same areas, especially when in close proximity to tributaries. This scope of work was originally submitted for the FY 2014–2015 request for proposals, however; the razorback sucker monitoring plan (Bestgen et al. 2012) was not incorporated into the RIPRAP at that time.

III. Study Goals, Objectives, End Product(s):

Goal:

Investigate razorback sucker aggregations to increase encounter rates, including other native fishes (e.g., Colorado pikeminnow), with the overall goal of accommodating data needs in the absence of a large-scale active sampling effort to gather similar information.

Objectives:

1. Deploy remote submersible PIT antennae to increase razorback sucker encounters in the middle Green River.
2. Adjust sampling locations and timing as needed to increase encounter rates of other endangered fishes (e.g., Colorado pikeminnow).

End product:

Knowledge gained through this project will allow us to determine new locations for stationary PIT equipment to increase razorback sucker encounter rates in a more cost-effective manner so that we can improve monitoring of adult life stages (see Zelasko et al. 2010). Razorback sucker and other native and endangered fish encounter data will be provided to the STReaMS database where it may be utilized by researchers to complement existing data gained through other UCRRP projects in order to provide a more robust data set for basin-wide survival and/or population estimation.

IV. Study Area:

Meant to compliment UCRRP Project #169 (previously Baeser #C6), which already focuses on PIA deployment at Razorback Bar and other locations upstream of that site, our study area consists of an 11.8 mile section of the middle Green River downstream of Razorback Bar. For razorback sucker, our focus will be from just below Razorback Bar (RM 310.8) to the downstream boundary of Dinosaur National Monument (RM 305.8), but we will also sample key tributary habitats downstream, mainly Brush Creek (RM 304.6) and Ashley Creek confluences (RM 299.0) to obtain additional information on Colorado pikeminnow and other native fishes.

V. Study Methods/Approach:

Surveys will focus around the estimated spawning period for razorback sucker (and potentially Colorado pikeminnow as directed by the Recovery Program); based on temperature-derived model predictions (i.e., peak spawning dates) provided by the Larval Fish Lab and real-time observations of fish captures during UCRRP Project #123b. More specifically, sampling events will be timed in an attempt to maximize encounters and determine additional aggregations within the study reach. The presence of larval razorback sucker and/or larval Colorado pikeminnow in Green River drift as determined through UCRRP Project #22F, will serve as verification that the spawning period is complete and that these surveys should no longer occur.

Submersible PIT antennae (Biomark Inc.; 36" circular design) will be deployed prior to the ascending limb of the hydrograph and arrival of spawning razorback sucker. Initial deployment will likely occur in April, but timing will depend on annual hydrology. Other than established areas (Brush and Ashley creeks) where submersible antennae will be used in combination with fyke nets for UCRRP Project#123b, antenna locations will be selected using a random stratified design, incorporating desirable habitats determined from an initial scouting trip. Up to 10 submersible PIT antennae will be deployed in total, depending on equipment availability. Following initial deployment, crews will revisit antennae locations to replace batteries, download data, and conduct general equipment maintenance once every three weeks (5 visits total). At each deployment location, antennae will be tethered to a fixed object on the shoreline, weighted to the river bottom, and attached to float buoys at the water surface. Antennae locations will be adjusted as needed to maximize encounters.

VI. Task Description and Schedule:

Task 1. Submersible antennae deployment, maintenance, and downloads.

Task 2. Data entry, analysis, and reporting.

Task	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				X	X	X						
2			X	X	X	X						
3										X	X	X

VII. Deliverables, Due Dates, and Budget by Fiscal Year:

An annual report to be submitted to the Recovery Program in November each year.

Budget explanation: (a) The State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately $8,000/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

<u>FY 2018</u>

Task 1. Submersible antennae deployment, maintenance, and downloading.

	Rate	Hours/Units	Cost
Labor			
Biologist I	32.70	60	1961.87
Technician II	18.19	30	545.70
Technician I	16.89	30	506.70
		Subtotal	**$3,014**
Travel			
3 trucks @ 2% of annual use[a]	24000.00	0.02	480.00
Per diem (6 day trips x 2 people)	14.00	12	168.00
		Subtotal	**$648**
Equipment			
Boat fuel (gallons)	4.00	50	200.00
		Subtotal	**200.00**
		Task 1 Total	**3862.27**

Task 2. Data entry, analysis and reporting.

	Rate	Hours/Units	Cost
Labor			
Project Leader	36.95	20	739.00
Biologist I	32.70	80	2615.83
Technician I	16.89	80	1351.20
		Task 2 Total	**$4,706**
		FY 2018 Total	**8568.30**

FY 2019

Task 1. Submersible antennae deployment, maintenance, and downloading.

	Rate	Hours/Units	Cost
Labor			
Biologist I	33.35	60	2001.11
Technician II	18.55	30	556.61
Technician I	17.23	30	516.83
		Subtotal	**$3,075**
Travel			
3 trucks @ 2% of annual use[a]	24480.00	0.02	489.60
Per diem (6 day trips x 2 people)	14.28	12	171.36
		Subtotal	**$661**
Equipment			
Boat fuel (gallons)	4.08	50	204.00
		Subtotal	**204.00**
		Task 1 Total	**3939.52**

Task 2. Data entry, analysis and reporting.

	Rate	Hours/Units	Cost

Labor			
Project Leader	37.69	20	753.78
Biologist I	33.35	80	2668.15
Technician I	17.23	80	1378.22
		Task 2 Total	**$4,800**
		FY 2019 Total	**8739.67**

FY 2020

Task 1. Submersible antennae deployment, maintenance, and downloading.

	Rate	Hours/Units	Cost
Labor			
Biologist I	34.02	60	2041.13
Technician II	18.92	30	567.75
Technician I	17.57	30	527.17
		Subtotal	**$3,136**
Travel			
3 trucks @ 2% of annual use[a]	24969.60	0.02	499.39
Per diem (6 day trips x 2 people)	14.57	12	174.79
		Subtotal	**$674**
Equipment			
Boat fuel (gallons)	4.16	50	208.08
		Subtotal	**208.08**
		Task 1 Total	**4018.31**

Task 2. Data entry, analysis and reporting.

	Rate	Hours/Units	Cost
Labor			
Project Leader	38.44	20	768.86
Biologist I	34.02	80	2721.51
Technician I	17.57	80	1405.79
		Task 2 Total	**$4,896**
		FY 2020 Total	**8914.46**

FY 2021

Task 1. Submersible antennae deployment, maintenance, and downloading.

	Rate	Hours/Units	Cost
Labor			
Biologist I	34.70	60	2081.95
Technician II	19.30	30	579.10
Technician I	17.92	30	537.71
		Subtotal	**$3,199**
Travel			

3 trucks @ 2% of annual use[a]	25468.99	0.02	509.38
Per diem (6 day trips x 2 people)	14.86	12	178.28
		Subtotal	**$688**
Equipment			
Boat fuel (gallons)	4.24	50	212.24
		Subtotal	**212.24**
		Task 1 Total	**4098.67**

Task 2. Data entry, analysis and reporting.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	39.21	20	784.23
Biologist I	34.70	80	2775.94
Technician I	17.92	80	1433.90
		Task 2 Total	**$4,994**
		FY 2021 Total	**9092.75**

FY 2022

Task 1. Submersible antennae deployment, maintenance, and downloading.			
	Rate	Hours/Units	Cost
Labor			
Biologist I	35.39	60	2123.59
Technician II	19.69	30	590.68
Technician I	18.28	30	548.47
		Subtotal	**$3,263**
Travel			
3 trucks @ 2% of annual use[a]	25978.37	0.02	519.57
Per diem (6 day trips x 2 people)	15.15	12	181.85
		Subtotal	**$701**
Equipment			
Boat fuel (gallons)	4.33	50	216.49
		Subtotal	**216.49**
		Task 1 Total	**4180.65**

Task 2. Data entry, analysis and reporting.			
	Rate	Hours/Units	Cost
Labor			
Project Leader	40.00	20	799.92
Biologist I	35.39	80	2831.46
Technician I	18.28	80	1462.58
		Task 2 Total	**$5,094**
		FY 2022 Total	**9274.60**

VIII. Budget Summary:

	TOTAL
FY 2018	$8,568
FY 2019	$8,740
FY 2020	$8,740
FY 2021	$9,093
FY 2022	$9,275
TOTAL	**$44,415**

IX. Reviewers: Tildon Jones 4/26/2017

X. References:

Bestgen, K.R., K.A. Zelasko, and G.C. White. 2012. Monitoring reproduction, recruitment, and population status of razorback suckers in the Upper Colorado River basin. Final Report to the Upper Colorado River Endangered Fish Recovery Program, U.S. Fish and Wildlife Service, Denver. Larval Fish Laboratory Contribution 170.

Modde, T., Z.H. Bowen, and D.C. Kitcheyan. 2005. Spatial and temporal use of a spawning site in the Middle Green River by wild and hatchery-reared razorback suckers. Transactions of the American Fisheries Society 134:937–944.

Modde, T., Z.H. and D.B. Irving. 1998. Use of multiple spawning sites and seasonal movement by razorback suckers in the middle Green River, Utah. North American Journal of Fisheries Management 18:318–326.

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Webber, P.A., K.R. Bestgen, and G.B. Haines. 2013. Tributary spawning by endangered Colorado River basin fishes in the White River. North American Journal of Fisheries Management 33:1166–1171.

Zelasko, K.A, K.R. Bestgen, and G.C. White. 2010. Survival rate estimation and movement of hatchery-reared razorback suckers *Xyrauchen texanus* in the Upper Colorado River Basin, Utah and Colorado. Transactions of the American Fisheries Society 139:1478–1499.